UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

APR 12 1995

Mr. William F. Caton
Secretary, Federal Communications
Commission
1919 M Street, N.W.
Washington, D.C. 20554

Dear Mr. Caton:

Enclosed are the Reply Comments of the National Oceanic and Atmospheric Administration in response to the Commission's Second Notice of Inquiry on U.S. proposals for the 1995 World Radio Conference.

If additional information is required, please contact Richard Barth at (301) 457-5153.

Sincerely,

Diana H. Hopkins

for D. James Baker

Enclosures

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THE ADMINISTRATOR

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Preparation for International	)	IC Docket No. 94-31
Telecommunication Union World	)	
Radiocommunication Conferences	)	

REPLY COMMENTS
of the

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

on the
SECOND NOTICE OF INQUIRY

D. James Baker
Under Secretary for
Oceans and Atmosphere

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April 14, 1995

SUMMARY

The National Oceanic and Atmospheric Administration (NOAA) is responsible for weather prediction and warnings that protect the lives and property of the public as well as promoting industry. Its operations require the use of bands of frequencies currently allocated to science services (*e.g.* meteorology) which have in recent years come under pressure from commercial users. NOAA has cooperated with industry in the past, resulting in, *e.g.*, creation of the 137-138 MHz primary downlink band for Little LEOs. Such cooperation is expected to continue in the future; however, it is essential that band sharing come about in manner which will protect the integrity of NOAA's operations. We are concerned that this protection will not be provided under some proposals made in Comments filed in this proceeding. In particular:

NOAA plans to stop using most of the 137-138 MHz band beginning with the next generation of polar orbiting satellites to be designed. However, current designs will need to use existing frequencies for an indeterminate period. It would be inappropriate to schedule a fixed sunset period for metsat migration to the band edges.

Use of the 162-174 MHz government band for MSS is highly questionable for reasons cited herein and in the Comments of others.

WARC-92 allocated 1675-1710 MHz to MSS in Region 2 despite doubts about the compatibility of MSS with meteorological operations. The primary reason for these doubts was the lack of definitive information showing compatibility with meteorological use of this band; this reason remains valid today. The ill-advised efforts to expand this allocation should be resisted firmly. Footnote 735A, created by WARC-92 to protect meteorological operations in this band, must remain, and should be strengthened if possible.

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SECOND NOTICE OF INQUIRY

The National Oceanic and Atmospheric Administration (NOAA) is pleased to have this opportunity to reply to earlier Comments. We have followed this proceeding with great interest, having assisted the progress of the Mobile Satellite Service (MSS) since the earliest days of the industry. NOAA provided the primary downlink band for the first wave of Little LEOs by agreeing to move its meteorological satellite (metsat) operations to the edges of the 137-138 MHz band. NOAA also participated actively in the Negotiated Rulemaking Committee which agreed on operating rules for Little LEOs. In the same vein, NOAA intends to assist in the development of the industry to the maximum extent consistent with our critical mission requirements. We noted earlier (NOAA Comments, p. 2) that NOAA's

mission involves weather forecasting and storm tracking that protects life and property, and the collection, processing and distribution of environmental information to promote industry and commerce.

We are concerned that some proposals of the MSS industry and the Commission's Industry Advisory Committee (IAC) treat too cavalierly the need for compatibility with existing services whose bands they propose to share. The attempts to disregard the need for compatibility, to assume its presence where it may well not exist, or to attempt the removal of existing band occupants, are discussed below.

137-138 MHz

A major virtue of the Automatic Picture Transmission (APT) system which NOAA operates in this band is that it makes available wide-area weather in graphic form at very little cost. For years NOAA has made information on how to build receiving stations to capture and display APT images, and many hobbyists and professionals have built their own earth terminals. Today there are a number of commercial manufacturers in the United States marketing such systems to schools, government organizations and commercial facilities. In many third world countries, APT is the only dependable, readily available source of real-time weather information. For these reasons, we must continue to provide it.

NOAA has agreed that it can maintain APT service using only a part of this band, and expects to begin a transition toward the WARC-92 band edge regions beginning with the

launch of NOAA-N about the year 2000. We currently expect existing designs of NOAA satellites, which use mid-band frequencies, to continue in operation until at least 2010. These dates are uncertain because of major changes in NOAA's system design expected to result from convergence of NOAA satellites with the Defense Department's DMSP metsats. (See NOAA Comments, p. 4.) Because of this uncertainty, we consider it inappropriate at this point to introduce changes to the allocation table that would impose firm deadlines for the move of metsats to the band edges. Such changes can be made with reasonable dispatch when additional information becomes available, since WRCs are now held every two years.

CTA refers (Comments, pp. 4 and 16-17) to the "phasing out" of metsats from the 137-138 MHz band, suggesting that "With the convergence of DOD and NOAA MetSat programs, and possible collaboration with European programs, it is possible to migrate the current MetSat users into other spectrum that provides clear bands for their use." As stated above, and in our previous Comments, NOAA intends to continue indefinitely its metsat operations in two subbands, as agreed during early discussions with MSS proponents and embodied in the results of WARC-92.

We must further disagree with CTA's contention (Comments, p. 17) that to eliminate APT from the 137-138 MHz band provides "...greatest benefit to the public." Two other Little LEOs claim the ability to operate in the central part of the band, sharing it with metsats. The creation of me-too MSS systems does not strike us as a greater public benefit than the availability of free weather data from metsats.

162-174 MHz

There were several proposals to use spectrum in the 152-174 MHz region for the MSS.

* CTA (Comments, p. 11) describes the 152.855-156.2475 MHz and 157.1875-173.2 MHz bands as "...allocated in the U.S. to non-government LAND MOBILE on a primary basis." (Emphasis added.)

* LEO One (Comments, p. 11) describes the 157.0375-174 MHz band as follows: "In the United States, this band is used for commercial, non-government private mobile and fixed radio services." (Emphasis added.)

* GE Americom (Comments, p. 11) describes the 152.855-156.2475 MHz and 157.1875-173.2 MHz bands as "...allocated on a primary basis to non-government land mobile in the U.S. and to FSS and MSS in Regions 1,2 and 3." (Emphasis added.)

Reference to the allocation table, however, shows clearly that:

* The band 162.0125-173.2 MHz is allocated on a primary basis to Government Fixed and Mobile operations, with limited non-Government operations permitted by footnote on specific frequencies and for stated purposes; and, by the way,
* Nowhere on this planet is any of these bands allocated to the FSS or the MSS.

The occurrence of the same error in three separate filings makes one suspect a common origination by someone who doesn't really understand VHF land mobile operations in this country. The IAC report correctly says (p. 17) of the 157.0375-174 MHz band: "Currently allocated to FIXED and MOBILE in the U.S. for the government, it also contains allocations to MARITIME MOBILE and LAND MOBILE for non-government use."

The IAC gave these bands "Priority 2", indicating its belief that the bands were technically shareable, but that worldwide allocations would be difficult to achieve. NOAA cannot address the shareability of the nongovernment mobile spectrum below 162 MHz. However both Motorola (Comments, pp. 14 *et. seq.*) and UTC, who know something about the subject, seem to believe the IAC's optimism is misplaced.

Regarding the government fixed and mobile operations between 162 and 174 MHz, much of the same reasoning applies. This band is so heavily used that the Interdepartment Radio Advisory Committee (IRAC) and NTIA recently reduced channel bandwidths from 25 KHz to 12.5 KHz to provide additional capacity. CTA suggests (Comments, p.11) that "This band could be used most effectively in the space-to-Earth direction." MSS receivers, listening for weak signals from earth orbit, would be vulnerable to harmful interference from a large number of fixed and mobile stations having transmit powers up to 1 kilowatt or more. If used in the other direction, the low-power transmitters to be used by Little LEOs would be swamped by higher powered Federal systems and, because of their unconstrained mobility, would be likely to cause unacceptable interference to terrestrial systems.

1670-1710 MHz

This band is one of two used worldwide by metsats and meteorological aids (met aids), such as radiosondes. (The other is at 400-406 MHz.) The data collected from these systems are distributed globally under the auspices of the World Meteorological Organization (WMO) and used as input to computerized weather prediction models. These models are highly dependent on a continuous flow of accurate data, the loss of which will degrade the accuracy of the forecasts produced.

Several proposals have been made in the comments which would have an adverse effect on one or both of these systems.

Meteorological Aids Issues

In urging that the ITU Region 2 MSS allocation be expanded to include Regions 1 and 3, Motorola (Comments, page 7) states:

> "In most of the world, the band is very lightly used by radiosondes, if at all. Only 20 percent of radiosondes in the world today employ this band. (The other 80 percent of radiosondes in the world use the 400 MHz band.) Moreover, more than half of this usage is in the U.S. and other nations in Region 2 whose use of radiosondes is subsidized by the U.S. government. Thus, it is readily seen that use of the 1675-1700 MHz band for radiosondes outside Region 2 is quite small. Therefore, it seems reasonable to believe that sharing this band between MSS and Metsat systems should be much simpler in Regions 1 and 3 than it is in Region 2."
>
> (Note: It is assumed that the reference to "Metsat systems" in the last sentence should instead be to "met aids systems", since the paragraph deals with radiosondes, not satellites.)

Information available to the National Weather Service indicates that this paragraph contains significant errors. In particular:

* A WMO report shows that approximately 30 percent of the radiosonde locations reporting data over the meteorologists' Global Telecommunications System fly 1680 MHz radiosondes. Countries outside Region 2 combined have about as many 1680 MHz sites as are known to exist in Region 2. These figures do not include worldwide military use of this band for mobile units, academic research, pollution tracking or other flights not related to weather forecasting.

* Although Motorola claims that 80 percent of the world uses 400 MHz, the actual figure is more like 50 percent. Alone, the former USSR reports 20 percent of the world's radiosonde usage at 1782 MHz. This frequency is not allocated to met aids internationally; Russia reportedly plans to move its 1782 MHz systems to the 1680 MHz band.

* It appears that the U.S. network in the Pacific has 1680 MHz stations in Region 3. Countries using 1680 MHz include Denmark, Yugoslavia, Turkey, Bangladesh, India, Japan, Thailand, South Africa and others.

The use of 400 and 1680 MHz is somewhat dynamic. Currently, some of NOAA's Caribbean locations are being converted to 400 MHz (10 locations projected over the next

two years) from 1680 MHz. Conversions from 400 to 1680 MHz will result from the demise (expected within the next few years) of the ALPHA, OMEGA and Loran-C systems. These are used by some 400 MHz radiosondes for position determination, since radiosondes at this frequency cannot be tracked with an antenna of practical size. Conversion to GPS tracking is often unavailable, since radiosondes using this technique are prohibitively expensive for some users. In addition, the European Radio Office has recommended that radiosondes be moved to 1680 MHz.

NOAA has already pointed out (NOAA Comments, p. 3) the interdependence of the world's weather forecasters. Prediction models in the United States, for example, depend for their accuracy on data collected throughout the world. It is in the interest of the United States to encourage and promote data collection by other countries, and NOAA spends considerable sums to support radiosonde operations in other parts of the world. Radiosondes are basically expendable, since even in the United States very few are returned for reuse, and upwards of 800 a year must be bought for each launch site in order to maintain the WMO-recommended minimum of two launches a day. Because of the high costs involved, there are nations which cannot afford to maintain this schedule. This situation prevails despite the widespread use of inexpensive radiosondes having poor frequency stability. Major improvements to radiosonde stability are therefore not practicable for some administrations.

AMSC (Comments, pp. ii, 11) proposes that the met aids allocation in this band be reduced to 1668.4-1685 MHz, a total of 16.6 MHz or about half the bandwidth now

allocated. The amount of usable spectrum would be less than this, however, for several reasons. The band 1668.4-1670 MHz is allocated to the radioastronomy service, and for that reason is not used for met aids in the United States and would be unavailable in other parts of the world. Similarly, the use of frequencies in this band for metsat downlinks has precluded their use by radiosondes in parts of this country, and would have the same effect elsewhere. Within the United States, a recently published report by NTIA, pursuant to a requirement of the Omnibus Budget Reconciliation Act of 1993, makes the 1670-1675 MHz band unavailable to met aids beginning in 1999.

In sum, the AMSC proposal would require higher frequency stability than appears at first glance to be the case. The costs involved are expected to result in curtailment or elimination of radiosonde operations by a number of less wealthy administrations. This would damage the weather forecasting capabilities of the United States and other countries.

The National Academy of Science's Committee on Radio Frequencies (CORF) notes that the use of radiosondes in research and other non-operational situations involves unscheduled launches as frequently as every 3 or 4 hours from locations which may move between launches. (CORF Comments, p. 14.) While operational launches by NOAA and others are nominally made twice a day, the threat of severe weather will also cause more frequent missions. Once launched, radiosondes typically fly for several hours and cover distances well over a hundred miles. The notion that the MSS can somehow "work around" radiosondes appears quite unrealistic.

Spectrum sharing between the MSS and met aids is only now being considered in the ITU-R arena, and there is no basis for an assumption of compatibility.

Meteorological Satellite Issues

A number of comments were submitted assuming that compatibility has been demonstrated between metsats and the MSS in this band. AMSC, for example, states (AMSC Comments, p. 11) that "...sharing is currently feasible between MSS systems and meteorological satellite systems." This assumption is unjustified by any studies to date; while there have been tentative agreements on the possibility of sharing between the MSS and metsats, much work remains to be done. The MSS industry itself makes clear its own disbelief in its compatibility by trying to eliminate FN735A, which requires the MSS to protect meteorological satellites. The industry would not be so eager to rid itself of the need to protect meteorology if it believed itself capable of doing so.

Proposed Footnote Modifications

Footnote 735A requires the MSS to protect, and not to inhibit the expansion of, the metsat service and the met aids service. In putting this requirement in place to protect meteorological systems, WARC-92 simply wrote into the regulations the assurances received from MSS proponents that they could share the band without harm to meteorology. The industry seems now to have lost confidence in its ability to live by those assurances, and one sees in its Comments numerous requests that it be relieved of the onerous burden of having to live up to its promises.

Various arguments are given to support this position, to include assertions that protection of meteorological systems is somehow unnecessary in light of work done by ITU-R. As we noted earlier, ITU-R has not yet completed its work. Appendix 28 coordination contours for metsat ground stations are to be addressed at WRC-97; compatibility issues for MSS and metsats are under study; and the compatibility of the MSS with meteorological aids, which are widely used in this band, is only now beginning in U.S. WP7C. To expand the existing Region 2 allocation worldwide, on either a primary or a secondary basis, is entirely premature. Indeed, it appears entirely possible that studies may show that the MSS cannot share this band with current users. It would be a tremendous disservice to the fledgling MSS industry to encourage investment in a band that it may not be able to use.

One also finds arguments made that since FN735A protects one primary service from another, it is inappropriate or somehow confusing. In fact, it is neither. When this footnote was written, WARC-92 knew full well that both services were to be primary, and meant to protect metsats and met aids from the MSS.

A limited number of methods were available to accomplish this. The MSS could have been made secondary, but would then have been vulnerable to disruption by other secondary services. A new, "super-primary" classification could have been created for meteorological systems, but would likely have run counter to the prevailing trend toward simplification of the rules. What WARC-92 did instead was to state its intentions clearly, in a footnote. Meteorological operations in this band are essential; lives and property depend on them. If

the MSS can demonstrate compatibility with both metsats and met aids (and it has yet to do so) then FN 735A can be removed at a future WRC. For the time being, it must remain for the simple reason that no new information is available which would justify its removal.

It is asserted by Motorola (Comments, p. 6) and by Iridium (Comments, p. 14) that "...to continue to provide unconditional super-primary status to future Metsat and Metaid systems is counter-productive to efficient use of the spectrum. The super-primary status for future systems will not encourage developers of such systems to employ spectrum-efficient techniques." It should be noted here that if the MSS can share with NOAA's metsats, it will be the result of GOES I-M systems requiring only 5 MHz for raw data transmission instead of the 20 MHz needed by GOES-7.

Parallel arguments are made by industry for the removal of FN 733E, which requires the protection of the radio astronomy (RA) service near 1.6 GHz. Arguments are made that being coequal primary, RA does not need such protection, and that to delete it is simply a clarification rather than a reversal of clearly stated priorities. Such is not the case; the WARC which made RA primary could have deleted the protective footnote, but elected not to do so.

Conclusion

Despite assertions that compatibility between the MSS and meteorological systems is demonstrated, or obvious, it is in fact neither. It is precisely because compatibility has not

been demonstrated that the Region 2 MSS allocation should not be expanded to other regions. For the same reason, Footnote 735A must remain in place to protect met systems in the event that the MSS begins operations in Region 2.

Other Matters

ORBCOMM (Comments, p. 13) expresses concern over the ten-person limitation on government representatives at international conferences, including WRCs. ORBCOMM notes that "..it is critical that the United States bring adequate resources to the conferences in order to safeguard and advance U.S. interests." and that "Industry representatives are not authorized to speak for the U.S. government...".

Noting that WRCs and related conferences typically have multiple concurrent sessions taking place, often late into the evening, is clearly not possible to have a few delegates covering all the bases. If essential national interests are to be advanced and protected, the knowledgeable agencies must be permitted to participate. To restrict government participation disserves both government and industry.